

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates, in general, to the packaging of products in flexible bags or containers and, more particularly, relates to an improved apparatus for bagging a product in a deformable bag and sealing it therein.

2. State of the Art

The distribution of perishable items, such as produce, as well as non-perishable products in thin, usually transparent, plastic bags has become widespread over the years. Plastic deformable bags have considerable strength and, further, have storage capabilities which enhance product quality and extend useful life. Mass production of these bags through automated machines has made them particularly desirable, feasible and cost effective.

Prior art Figure 1 schematically illustrates a typical bagging apparatus 10. The apparatus 10 includes a roll of plastic 12 which is folded at one end 14. The roll of plastic 12 is located with its axis 16 horizontal and is fed through several feed rollers 18, 20, 22 until it assumes a vertical position. A spreading device 24 is arranged to open the free end 15 of the folded plastic so that a product may be placed between the folded plastic film. Prior art Figure 2 schematically illustrates a sealing device 28. The sealing device

would be located beneath the spreading device 24 in Figure 1. The sealing device 28 generally includes an L-shaped heated bar 30 and an L-shaped resilient sealing surface 32. The two L-shaped members 30, 32 are slideably mounted on rods 34, 36 so that they may be moved together and apart. As shown in prior art Figures 3A and 3B, the heated bar 30 is movable within a clamp 38 and has a rounded end 39. When the L-shaped members are brought together, the clamp 38 holds the plastic sheet 12 against the sealing surface 32 and the heated bar 30 moves forward against the plastic to heat seal it and sever it from the roll of plastic. The sealing and severing locations are illustrated at 31 and 33 in Figure 1. After sealing, a finished bag 40 is severed from the roll of plastic. A small strip of plastic 42 is left attached to the roll and is taken up by a trim spool 44.

The prior art bagging apparatus has several disadvantages. First, the product must enter the apparatus horizontally between the spreading apparatus and rollers. Second, it is difficult to alter the size of the bags to accommodate different sized products. Third, in order to prevent ragged uneven seals, the heated bar must be coated with a non-stick material. Nevertheless, repeated cycling causes some residual buildup of plastic on the heated bar since it must penetrate the plastic to sever the bag from the roll. The abrasion on the bar by the act of penetrating the plastic causes the non-stick coating to wear off.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a bagging apparatus which allows product loading from either above or the side.

It is also an object of the invention to provide a bagging apparatus which is easily adjustable to make a wide variety of different sized bags

It is another object of the invention to provide a bagging apparatus with an improved sealing and severing system.

In accord with these objects which will be discussed in detail below, the vertical bagging apparatus of the present invention includes a vertically mounted spool for dispensing a roll of centerfold plastic film with the fold in the upper position. A pair of vertical metering rollers are mounted adjacent to the spool for advancing the film from the spool. An adjustable generally inverted-V-shaped film inverted is mounted downstream from the metering rollers. A sealing and severing system is located beneath the film inverter and a trim spool is located beneath the sealing and severing system. The film inverter turns the film inside out, relocating the fold from the horizontal axis to the vertical axis. The film inverter also causes the open end of the folded film to be accessible from either above or the side. The film inverter is adjustable by raising

and lowering the apex of the inverted-V which relocates the horizontal location of the fold in the film. According to a presently preferred embodiment, the film inverter is made from flexible wire and the free ends of the wire are attached to a takeup shaft. According to the invention, the sealing and severing system includes a flat faced heated bar and a sharp contoured compliant sealing surface. This system provides sealing and severing without buildup of plastic material on the heated bar because the severing is actually performed by the cool sealing surface rather than by the heated bar. The sealing and severing system is preferably arranged on gear coupled double pivot arms and is actuated by a double piston arrangement. Additional objects and advantages of the invention will become apparent to those skilled in the art upon reference to the detailed description taken in conjunction with the provided figures.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic perspective view of a portion of a prior art bagging apparatus;

Figure 2 is a schematic perspective view of the sealing and severing portion of a prior art bagging apparatus;

Figures 3A and 3B are side elevational views of a portion of the prior art sealing and severing apparatus;

Figure 4 is a schematic perspective view of a portion of a vertical bagging apparatus according to the invention;

Figure 5 is a view similar to Figure 4 but with the sealing and severing system removed;

Figure 6 is an enlarged perspective view of the film inverter;

Figure 7 is a schematic side elevational view of the film inverter in three different positions;

Figure 8 is an enlarged perspective view of the sealing and severing system;

Figures 9a and 9b are side elevational views of the sealing and severing system; and

Figure 9c is an enlarged side elevational view of a portion of the sealing and severing system;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to Figures 4 and 5, the vertical bagging apparatus 100 includes a vertically mounted spool 102 for dispensing a roll of centerfold plastic film 104 with the fold 106 in the upper position.

A pair of vertical metering rollers 108, 110 are mounted adjacent to the spool 102 for advancing the film 104 from the spool 102. A slack roller arm 112 is also provided between the spool 102 and the metering rollers 108, 110. An adjustable generally inverted-V-shaped film inverter 114 is mounted downstream from the metering rollers 108, 110. A sealing and severing system 116 is located beneath the film inverter 114 and a trim spool 118 is located beneath the sealing and severing system 116.

Turning now to Figures 5-7, the film inverter 114 is preferably made from a flexible wire 120 which is formed into an -inverted-V-shape by attaching the center 122 of the wire 120 to a lever 124. The free ends 126, 128 of the wire 120 are attached to a takeup shaft 130. The wire is spaced apart by loops 132, 134 so that it worms a generally triangular region between 132, 122, and 134. As seen best in Figures 5 and 7, the film inverter 114 turns the film 104 inside out, relocating the fold 106 from the horizontal axis to the vertical axis. The film inverter also causes the open end of the folded film 104 to be accessible from either above or the side. As shown in Figure 7, the film inverter 114 is adjustable by raising and lowering the lever 124 which raises and lowers the apex of the inverted-V which relocates the horizontal location of the fold 106 in the film. Figure 7 illustrates three different sizes of film 104a, 104b, 104c and shows the respective locations of their folds 106a, 106b, 106c.

Referring now to Figure 8, the sealing and severing system 116 includes an L-shaped heated bar 140 and a corresponding L-shaped sealing surface 142. The heated bar 140 is mounted on a first pivot arm 144 and the sealing surface 142 is mounted on a second pivot arm. Each pivot arm has a pair of spaced apart pivot points 144a, 144b, 146a, 146b. The pivot points 144a and 146a are coupled to each other by a rod 148a and two gears 150a, 152a. The pivot points 144b and 146b are coupled to each other by a rod 148b and two gears 150b, 152b. The pivot arms 144, 146 are actuated by a pair of spaced apart piston actuators 154a, 154b, each having a piston rod 156a, 156b as shown in Figure 8. The gear and bar couplings allow the L-shaped members to maintain a parallel relationship she sealing and severing as illustrated in Figures 9a and 9b. As shown in Figure 9c, the heated bar 140 is flat faced and surrounded by a clamp 158. The sealing surface 142 is provided with a sharp contour 160. When the sealing and severing system is actuated, the clamp 158 holds the plastic film against the sealing surface 142 and the heated bar 140 moves forward to press the film 104 onto the sharp contour 160 of the sealing surface. This system provides sealing and severing without buildup of plastic material on the heated bar 140 because the severing is actually performed by the contour 160 on the cool sealing surface 142 rather than by the heated bar.

There have been described and illustrated herein a vertical bagging apparatus. While particular embodiments of the invention have

been described, it is not intended that the invention be limited thereto, as it is intended that the invention be as broad in scope as the art will allow and that the specification be read likewise. It will therefore be appreciated by those skilled in the art that yet other modifications could be made to the provided invention without deviating from its spirit and scope as so claimed.